Remarks

The above amendments and these remarks are responsive to the Office Action mailed March 22, 2006. With entry of this amendment, Claims 5-12 and 33 are pending. Claims 5, 9 and 33 have been amended.

Applicant thanks the Examiner for consideration of the application. In the Office action, claims 1-4, and 12-32 were withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention. Election was made without traverse in Paper filed December 29, 2005. Claims 5, 9, and 33 are rejected under 35 U.S.C. § 102(b) as being anticipated by Majima (US Patent Number 6,761,147). Claims 6-7, and 10-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Majima in view of Takahashi et al. (US Patent Number 6,341,487).

Applicant respectfully traverses the rejections, but nevertheless amends the claims as indicated above. In view of the remarks below, and the amendments above, Applicant respectfully requests reconsideration of the application under 37 C.F.R. § 1.111 and allowance of the pending claims.

A. Introduction

The pending claims relate to various aspects of engine operation, such as selection and/or operation of the number of active valves in a cylinder carrying out combustion, as well as the spatial valve configuration of valves in a cylinder. Such engine operation may be based on various conditions, such as a catalyst operating condition, and can improve engine operation a number of ways. For example, a cylinder can vary the number of active valves as the catalyst warms up, thereby increasing fuel economy (by saving electrical energy by reduced valve

current) while meeting torque demands. As another example, a cylinder can vary the spatial location of active valve(s), thereby varying the amount of charge motion and/or burn duration to match catalyst operating conditions. Further still, other examples and/or advantages are described in the specification.

B. Claim Rejections Under 35 U.S.C. § 102(b)

Claims 5, 8-9, 12, and 33

Claims 5, 8-9, 12, and 33 have been rejected under 35 U.S.C. §102(b) as being anticipated by Majima. Applicant respectfully traverses the rejection, but nevertheless amends the Claims 1, 9, and 33 as indicated above.

Regarding Claim 5, it claims:

> A method for controlling the number of cylinder valves in at least a cylinder operating in a internal combustion engine, the method comprising:
>
> operating at least a cylinder to carry out combustion with a first number of active valves in a cycle of said cylinder, during at least a first operating condition of a catalyst; and
>
> operating said cylinder to carry out combustion with a second number of active valves in a cycle of said cylinder, during a second catalyst operating condition, said second catalyst operating condition different from said first catalyst operating condition and said first number of active valves different from said second number of active valves.

In this way, as noted above, it is possible to vary electrical power consumption while operating the cylinder, thereby enabling reduced power consumption and increased fuel economy under selected conditions.

Turning now to Majima, Applicant fails to find any disclosure of operating a cylinder with a different number of active valves at different catalyst operating conditions. Rather, Majima purports to disclose a control apparatus for an engine provided with variable valve

timing mechanism and a valve control means to control the intake valve to open multiple times per cycle of rotation of the engine. As shown in Fig. 7 of Majima, one intake valve and one exhaust valve are used in one cylinder. The intake valve control program is executed based on the early warm-up of the catalyst. During the early warm-up of the catalyst, the intake valve timing is retarded, and the intake valve is opened two times in one cycle, once on the exhaust stroke and once in the intake stroke. See Fig. 8, col. 10: line 11 to col. 11: line 29. When the early catalyst warm-up period is ended, normal valve control is performed. In the early catalyst warm-up period and normal operation period, both intake valve and exhaust valve are operating. The difference on the control between the early catalyst warm-up operation and normal valve operation is the valve timing and opening times of the intake valve in one combustion cycle.

As such, Applicants respectfully request that the rejection of claim 5 be withdrawn.

Regarding Claim 9, it claims:

> A method for controlling the valve pattern in at least a cylinder operating in an internal combustion engine, the method comprising:
>
> operating at least a cylinder to perform combustion with a first active valve configuration in a cycle of said cylinder, during at least a first operating condition of a catalyst; and
>
> operating said cylinder to perform combustion with a second active valve configuration in a cycle of said cylinder, during a second catalyst operating condition, said second catalyst operating condition different from said first catalyst operating condition, where the difference between the first valve configuration and the second valve configuration is at least one of active valve spatial location in said cylinder head.

Various differences in spatial location are described in the specification. For examples, the active valve configuration of the cylinder may vary spatial locations of an active intake valve. Alternatively, or in addition, it may vary spatial locations of an exhaust valve. Further, still other variations are also possible.

Applicant has reviewed Majima, and can find no disclosure of the operation of Claim 9. Rather, , in Majima, the spatial locations of active valves during different operating modes do not change. As such, the rejection of claim 9 should be withdrawn.

Regarding Claim 33, it claims:

> A method for determining a valve pattern in a cycle of an internal combustion engine, the method comprising:
>
> determining an operating condition of at least one catalyst brick located in an exhaust system of said internal combustion engine;
>
> selecting a number of cylinders in which to delay a valve opening after a combustion event in respective cylinders, based on said catalyst brick operating condition;
>
> varying a spatial valve pattern to of operate active valves in said selected cylinders, based on said catalyst brick operating condition , wherein said valve pattern includes at least one active valve; and
>
> operating said number of active valves in said selected cylinders during a cycle of said internal combustion engine.

Applicants respectfully submit that Majima fails to show various elements of claim 33. For example, since the spatial locations of active valves in Majima do not change, there can be no routine to vary the spatial location of active valve for different catalyst operating conditions.

Therefore, Applicant respectfully requests the rejection be withdrawn.

Claim 8 is dependent upon claim 5 and claim 12 is dependent upon claim 9. For at least reasons cited above, Applicant respectfully requests the rejections be withdrawn.

C. Claim Rejections Under 35 U.S.C. § 103(a)

Claims 6-7 and 10-11

Claims 6-7 and 10-11 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Majima in view of Takahashi et al.

Claims 6-7 are dependent upon claim 5 and claims 10-11 are dependent upon claim 9. For at least the reasons cited above for claims 5 and 9, Majima fails to show various claimed elements. Further, Takahashi et al. does not teach, disclose or suggest different valve numbers or different spatial valve configurations at different catalyst operating conditions. Thus, Applicants respectfully request this rejection be withdrawn.

D. Conclusion

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505.

CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being sent to the United States Patent and Trademark Office via facsimile at (571) 273-8300 on June 21, 2006.

Lauren Barberena

Respectfully submitted,
ALLEMAN HALL MCCOY RUSSELL & TUTTLE, LLP

Amber S. Reg. No. 55,655 for

Christopher S. Tuttle
Registration No. 41,357
Customer No. 36865
of Attorneys for Applicant
806 SW Broadway, Suite 600
Portland, Oregon 97205
Telephone: (503) 459-4141
Facsimile: (503) 459-4142